Upper Thomas Fork Creek Stream Bank Stabilization Projects

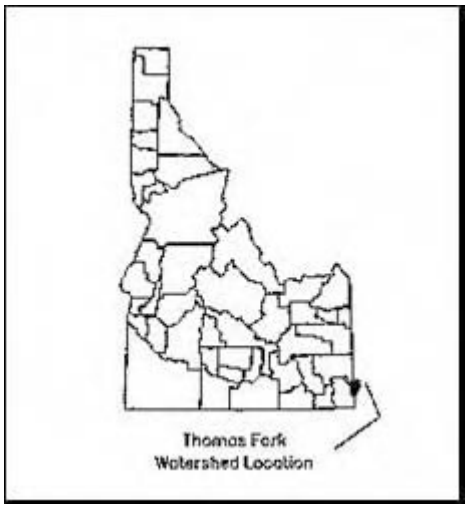

Figure 35 Location of Thomas Fork Creek.

Introduction

The Bear Lake Regional Commission (BLRC) initiated this project to address an identified sediment and dissolved nutrient loading problem in the Thomas Fork Creek. Specifically, a targeted reach of the Thomas Fork Creek in Bear Lake County, Idaho was selected for implementation of stream bank stabilization practices that were proven effective on prior projects on the Thomas Fork.

Project Goal and Objectives

The overall goal of the project was as follows:

"Improve the quality of water in the Thomas Fork Creek and stabilize the banks within the targeted reach, so the stream can sustain its beneficial uses as well as improve water quality conditions within the Bear River and Bear Lake."

The following objectives are specifically intended to meet the above goal:

Objective 1 Apply riparian and in-stream reclamation treatments along the Thomas Fork Creek for approximately 1,750-2,000 feet along degraded riparian zones.

Objective 2 Develop and implement a project administration, evaluation and environmental stewardship program that determines the effectiveness of the proposed activities and promotes their long-term care.

Key Issues

To meet the above stated goal and objectives and to accommodate the needs of the landowner, this project addresses the following issues:

- Restricting livestock access to Thomas Fork Creek in this section with a fence and controlled water access.

- Commencing riparian restoration due to a lack of riparian vegetation resulting in unstable bank conditions. Unstable bank conditions ultimately increase the total suspended solids within this reach of Thomas Fork Creek.

Description

The bank conditions found were vertical banks 7 to 12 feet high. The permitting and implementation of the BMPs were under the direction of the BLRC with assistance from the landowner. Monitoring by Ecosystem Research Institute of Logan, Utah included water quality chemistry and surveys of stream cross-sections.

Accomplishments

Outputs from the project include:

- Installation of BMPs on approximately 2,400 feet of stream bank and erection of exclusionary fencing at strategic locations along the riparian area adjacent to pastureland.
- Monitoring using three methods
- Water chemistry at one site
- Photo monitoring at each of the treatment sites
- Stream cross-section surveys at four locations in the project area
- Information and education display at the Bear Lake County Fair, fall 2005, presenting information about the project
- Landowner maintenance agreement on completed project work

Background

The Thomas Fork Watershed (Figure 36) consists of 150,100 acres located in Bear Lake County, Idaho and Lincoln County, Wyoming. The elevation of the valley floor of the watershed is about 6,600 feet above sea level. Thomas Fork Creek is a tributary to the Bear River immediately upstream from the diversion of the Bear River into Bear Lake. Bear Lake has been designated by the State of Idaho as a Special Resource Water. Thomas Fork is listed as a 303(d) stream not supporting the beneficial uses of cold water biota, salmonid spawning and primary and secondary contact recreation.

Figure 36. Thomas Fork Watershed.

Thomas Fork Creek represents a valuable resource of concern. However, in addition to the values of the Thomas Fork, the eutrophication of Bear Lake and the degradation of the Bear River is due, in part, to excessive stream bank erosion from Thomas Fork.

Methods

This project employed BMPs used on prior treatment sites in the same general area. These BMPs have been in place for over seven years. During the grant application process, for this project, thirteen sections of stream bank were selected for the installation of BMPs.

Construction of BMPs on the thirteen sections were completed during 2003 and 2004. Five different types of BMP treatments were employed. They included stream bank shaping, bank barbs, rock rip-wrap, toe armoring, reseeding, willow plantings.

Description of Treatments

Bank shaping involves the use of heavy equipment to excavate excess soil from the stream bank and reduce the angle of repose. A trackhoe has proved to be superior to a backhoe based on reach and stability.

Toe armor consists of large rock placed at the toe of the slope to prevent constant wave action from removing soil on recently excavated slopes.

Rip-rap is applied using landowner equipment. Rock is placed from the toe of the slope to near the crest of the bank. Local geologic material is used as rip-rap to keep soil in place until vegetation can root. Geologic material is quarried from nearby a nearby site and is composed of dense, angular material.

Grass seed was used to keep soil in place and uptake nutrients. Each site is prepped using steel grate dragged along surface. Seed was spread by hand to prepped, treated sites and also to areas rip wrapped.

Seeds were covered to prevent predation by animals. The seed mix is composed of drought-tolerant native species to encourage natural function and consists of Sheep Fescue, Crested Wheatgrass and Stream bank Wheatgrass. This mix was selected based on site conditions and agronomist recommendation.

Stream barbs applied to this project were constructed of native geologic material mined from local quarries using NRCS design from previous project along the same stretch. Core material is 1'-3' in diameter while cover material is 2"-10" in diameter and highly angular. Each barb was anchored into the bank and extended into the flow along the streambed, at a 45° angle, and directed upstream.

Willow stock was produced on site from existing healthy communities and placed to maximize rooting. Cuttings were placed at .5' intervals along treated areas or other areas as needed. Each cutting was pressed into the soil near the waters edge to make use of the water table. Density of cuttings was increased at rock barb locations.

Monitoring

Monitoring of this project included photographs, stream transects, and water chemistry:

- Photo monitoring includes photos before, during and after construction, plus bi-annually after construction. Photo monitoring will continue for 2-3 years on semi-annual rotations to document the longer term success at this site.
- Cross-sections of the creek were surveyed to document channel movement and stability along a stretch of treated stream bank. Three transects were established along the stretch to be treated. One additional transect is installed below the treated areas as a control point. These transects were surveyed before and after BMP implementation to define the effects of BMPs on channel stability.
- Water chemistry samples are used to quantify the success of BMP implementation on water quality. Water quality parameters are sampled on a quarterly rotation and submitted to an EPA certified laboratory for analysis. Constituents sampled consist of: nitrate, nitrite, ammonia, orthophosphorus, total phosphorus, and total suspended solids. Grab samples were collected downstream from treated areas and transported to the lab for further analysis.

Maintenance agreement

An agreement for maintenance of the stream bank BMPs was signed by the landowner and is on file with the Bear Lake Regional Commission.

Involvement of the public and other agencies

In addition to the Bear Lake Regional Commission, several other public and private organizations were involved with this project at different levels.

The location of this project with respect to US Highway 89 required cooperation with the Idaho Department of Transportation. Sections 6 and 7 of this project are within close proximity of US Highway 89. The close proximity of the project to the highway right-of-way required excavation work to take place within the right of way. Agreements were made with the Idaho Department of Transportation to work in the right-of-way. The Idaho Department of Transportation also donated time and equipment to transport excavated material to upland sites.

Without implementing BMPs on sections 6 and 7, Thomas Fork would have shortly toppled an existing power line on this landowner's property. Prior to construction, a power pole owned by Utah Power and Light was within one foot of toppling into the Thomas Fork. Efforts were made to coordinate with PacifiCorp power utility for removal of the power pole with excavation work as part of bank shaping.

Other organizations not directly linked to this project were instrumental in the implementation of BMPs. Bear Lake Watch, an organization devoted to involvement in many aspects of Bear Lake and Trout Unlimited were both represented by volunteers aiding in implementing BMPs. Membership from both groups contributed to the success of this project by planting willows on different segments of the project.

A fair booth was erected during the annual Bear Lake County Fair. The booth detailed the work engaged by the regional commission along Thomas Fork for the past seven years.

Results

The results section includes a narrative of the condition of BMPs after implementation and the monitoring information. Each treated area is considered as a segment and a description of type and amount of BMP implemented at each treated area is reported. Monitoring results include: water chemistry samples, photo points and surveyed cross sections. Segment reaches have been plotted on an aerial photo of the area (Figure 37).

Overall, treated areas are responding well to applied BMPs. Several unique factors appear to have strongly influenced this project. Willows were planted during July along segment 7 with incredible success. Figure 38 illustrates the condition of the willows one month after planting. This is unusual because willows planted in July often show signs of stress not long after planting and soon perish. It could be asserted that this success is due in part to above average precipitation falling at this location. Afternoon rainfall followed by cooler temperatures appears to have provided needed moisture for growth. Based on comparative observations with other projects completed by the Bear Lake Regional Commission, the additional moisture during the summer appears to have greatly improved survival rates for the willows (at least temporarily) and grasses.

Financial resources to acquire exclusionary fencing and water gaps will also help to achieve the goals and objectives of this section 319 grant. Over 8,000 linear feet of fencing was purchased to prevent animals from grazing new riparian grasses. This fencing was to be installed by the landowner and labor costs applied as match to the project. Early snow and late rains have slowed this effort, but verbal commitment from the landowner provides assurance that the fencing will be completed in the near future. Presently, installation of exclusionary fencing is 80% complete.

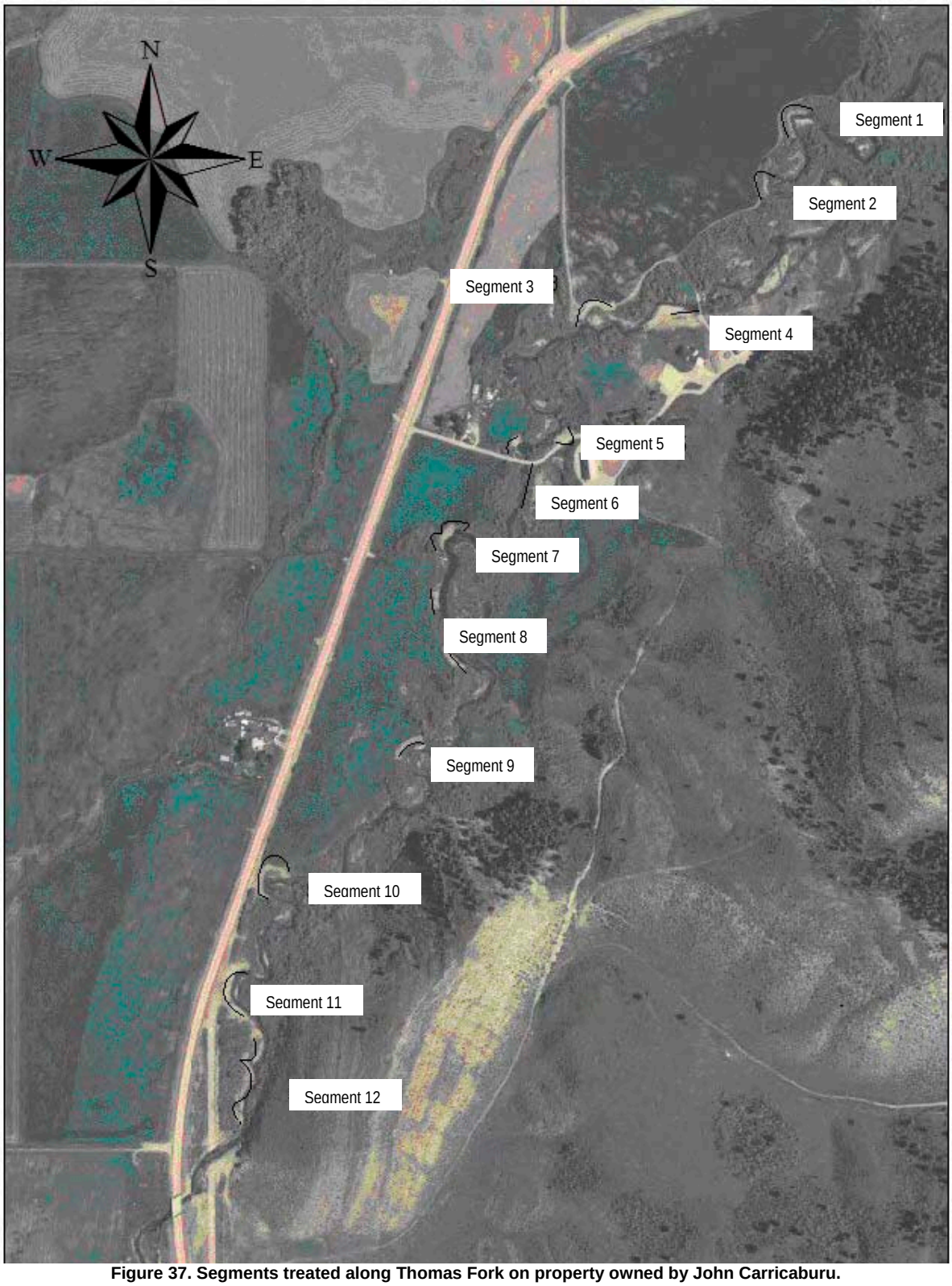

Figure 37. Segments treated along Thomas Fork on property owned by John Carricaburu.

Further description of each type of BMP implemented at each location and their condition one year after implementation is provided below.

Segment 1

Project construction was initiated and completed during the fall of 2004 on Segment 1. 160 linear feet of highly degraded stream bank were treated with rip-wrap, two bank barbs, toe armor, willow plantings, and reseeding techniques. Most of these treatments are in excellent condition. Willow cuttings that were planted during 2004 are virtually non-existent.

Segment 2

Construction was initiated and completed during the fall of 2003, along 100 linear feet of degraded riparian area. Treatments applied at this location include: rip-wrap, toe armor, three bank barbs, willow cuttings, reseeding, and sedge plugs. Most of the techniques implemented are in excellent condition. Willow plantings and sedge grass plugs are in poor condition or non-existent. Other improvements employed at this segment were the removal of existing (unapproved) stabilization practices. Three cars were removed from their placement along Thomas Fork Creek as erosion control many years ago. These treatments were removed from the stream and transported to a more appropriate location. Photos were taken before and after rehabilitation (Figure 38, Figure 39).

Segment 3

Once the primary channel for Thomas Fork Creek, this channel has now been largely abandoned except during high-flow events. However, during high flow events, unstable bank conditions contribute sediment and off site nutrients to the Thomas Fork. Implementation of BMPs was initiated and completed during Fall 2003. BMPs implemented along this 126 linear foot segment include: bank shaping, willow planting, and revegetation. All of the treatments are in excellent condition.

Segment 4

Season considerations of this 150 foot long segment encouraged the postponement of this segment until later. Start and finish at this location occurred during the spring of 2004. Treatments include toe armor, rip-wrap, willow plantings, grass reseeding, and two barbs. Most of the treatments applied at this location are in excellent condition. The barbs seem to have washed away and the willow growth at this location is poor.,

Figure 38. Segment 2 prior to treatment with BMPs.

Figure 39. Segment 2 after treatment with BMPs.

Segment 5

This segment considers two small, separate cut banks that are within close proximity but which will be distinguished as upper and lower. Combining the two under the same segment heading simplifies

describing them as they are within close proximity, yet difficult to separate on the map. The upper section is 35 linear feet and included the following treatments: bank shaping, toe armor, one bank barb, rip-wrap, willow plantings, bundles, and reseeding. Most of the treatments at this location are in excellent condition. Willow plantings and bundles appear to be non-existent except for pre-existing material.

Treatments applied along 65 linear feet at the lower site are similar to those at the upper site with the addition of removing previous attempts at protecting the stream bank. Approximately four hours were spent removing abandoned concrete slabs that had been placed at this location to prevent further erosion of cropland. These relics were removed to an upland location away from the stream.

Segment 6

125 linear feet along segment 6 was not considered as part of the original application to perform this work at this location. Between the time the application was submitted and approved, appreciable loss had taken place to warrant treatment. BMPs applied at this location include: bank shaping, and reseeding. Reseeding treatments appear to be successful.

Segment 7

Treatments applied along 100 linear feet at segment seven provided results contrary to convention. Treatments included bank shaping, willow planting, and reseeding. Willows were planted during July, which is contrary to popular convention; leading science suggests that willow regrowth is maximized when planted in early spring or late fall when plants are dormant. One month after planting, nearly 100% of those plantings were alive and healthy (Figure 40). Grass seed spread approximately the same time was also growing in abundance. One year later, nearly all of the willows are gone. Ninety-eight (98) percent of those still at the site have produced new growth and appear healthy. However, many of these same plants were either consumed or hauled away by beavers (Figure 41).

Segment 8

Treatments applied at segment 8 are identical to those implemented at segment 7 because of similar conditions. Treatments along 250 linear feet include bank shaping, willow planting, and reseeding. Results are also similar to segment 7. Many of the willows have been removed but 90% of those still standing are alive and well. Grass seed is propagating rapidly and can be observed stabilizing existing conditions.

Figure 40. Success of willows planted in July (photo taken one month after planting).

Figure 41. Segment 7 willow plantings after one year.

Segment 9

Treatments applied along this segment include toe armor, rip-wrap, reseeding, willow planting. All treatments applied along this 173 foot segment are in excellent condition save the willows.

Segment 10

Treatments along 240 linear feet of unstable stream banks at this segment include bank shaping, toe armor, rip-wrap, willow planting, and reseeding. Similar to other segments, all treatments applied were in excellent condition. No willows were planted at this site due to miscommunication with volunteers and lessons learned from upstream segments.

Additional help was received from the Idaho Department of Transportation during bank shaping at this location. This segment was within close proximity to right of way owned by the highway that was being threatened by Thomas Fork. The Department of Transportation donated time and equipment necessary to haul away overburden created by bank shaping and safety personnel while working in the right of way. Over 21 dump truck loads of soil were removed from this site and transported to an upstream location by the Idaho Department of Transportation.

Segment 11

Treatments along this segment of highly eroded stream bank (Figure 42) include: bank shaping, rip-wrap, grass seed, and two bank barbs. These treatments were applied along 400 linear feet of stream bank to stabilize the channel meandering toward US highway 89. All of these treatments are in excellent condition (Figure 43). Willows were not planted at this location. Unsuccessful results at upstream locations were cause for not using this treatment at this location.

Idaho Department of Transportation was instrumental in assisting the Bear Lake Regional Commission during bank shaping at this location. Similar to Segment 10, this segment was close to the highway and required excavation activities to take place in the right of way. Idaho Department of Transportation donated time and equipment for the purpose of removing soil accumulated during bank shaping activities. Twenty-two dump-truck loads of soil were transported from this site to an upstream location courtesy of the Idaho Department of Transportation.

Figure 42. Segment 11 before treatment with BMPs.

Figure 43. One year after implementation of BMPs, Segment 11.

Not originally part of the proposal, this area showed evidence of unstable bank activity. Treatments applied at this location include: bank shaping and reseeding. Both treatments are in excellent condition and are aiding in reestablishing a healthy riparian zone.

Water Chemistry

One station on Thomas Fork Creek was sampled during 2004 and 2005 as part of the Thomas Fork Bank Stabilization Project. This location has been used as an upper sampling site for several years and was suitable as a sampling location for this project because of its location below the project area. Grab

samples were analyzed for nutrients (nitrate+nitrite, ammonia, total phosphorus and orthophosphorus) as well as total suspended solids. Increases observed in water chemistry could be attributed to stream flows greater than observed during the last five years. Nutrients and total suspended solids were analyzed at an EPA certified water laboratory.

An overall decrease in total inorganic nitrogen (TIN) load (expressed in lb/yr) in Thomas Fork Creek above upper Geneva Bridge has occurred since the completion of construction and bank stabilization projects within the Thomas Fork drainage. Nitrogen has been a target water quality parameter because of the dairy activities in the watershed and the high concentration of TIN observed in the Thomas Fork in the initial water quality investigations in the watershed.

Total suspended solid (TSS) was chosen as a monitoring parameter because of the direct correlation to unstable stream banks and the potential for future stabilization projects along Thomas Fork Creek. Reductions in concentration have occurred since 1999. It is not surprising that these concentrations would be decreasing given the number of linear feet of stream bank treated with BMPs along Thomas Fork.

To determine the magnitude of water quality improvements seen since the bank stabilization project began in 1997, nutrient loading at the Thomas Fork at Upper bridge (expressed in lb/day) for dissolved orthophosphorus, total phosphorus and total inorganic nitrogen (NH_3+NO_3+NO_2), and total suspended solids (expressed in tons/year) was compared over the period on projects implemented.

Nutrient loading for all four parameters decreased dramatically over the time period. All of the parameters display similar behavior following high flow events. 1998 and 2005 were the only high flow events over the last seven years.

Total phosphorus and orthophosphorus achieved similar reductions around 54%. Total phosphorus was reduced from 14,744 lbs/year to 8,135 lbs/year and orthophosphorus was reduced from 7,033 lbs/year to 3,050 lbs/year.

Total inorganic nitrogen loading was reduced by 73% from 30,707 lbs/year to 8,135 lbs/year. Reductions in total suspended solids were by the far the greatest with 93% from 21,465 tons/year to 1,417 tons/year.

Conclusions

Areas treated with BMPs along these segments appear to have accomplished their design by reducing sediment and nutrient inputs to Thomas Fork Creek. Overall, a majority of the areas treated within the scope of this project are functioning well.

Water chemistry sampling suggests that treatments applied have reduced the sediment and nutrients entering the Thomas Fork Creek. Cross-sectional surveys of Thomas Fork Creek indicate treatments have stabilized the stream bank without causing adverse channel migration downstream. Documentation through photo points and other locations along the project help support the results of the water chemistry monitoring and surveyed cross-sections.

Kinsey Corral Relocation and Riparian Fencing Project

McMullen Creek is listed on the State of Idaho's 1998 303(d) list of water quality impaired waters. The pollutants of concern are bacteria (*E. coli*), sediment, and phosphorous. The existing beneficial uses under the Upper Snake River TMDL for McMullen Creek are agricultural water supply, cold water aquatic life, secondary contact recreation and industrial water supply.

Funding Sources

Twin Falls Soil & Water Conservation District sought out funding to assist the Kinsey family in implementing best management practices on McMullen Creek. The District and the Kinsey family combined different sources of funding to get these BMPs on the ground. The funding sources include section 319 grant money, Soil Conservation Commission Water Quality grant money, a Soil Conservation Commission Water Quality loan to the Kinsey family, NRCS Environmental Quality Incentives Program (EQUIP) funding, and a great deal of matched labor by the Kinsey family.

Accomplishments

This project applied riparian BMPs to address water quality concerns relating to the Kinsey family animal feeding operation on McMullen Creek. The Kinseys wintered 500 head of cattle for approximately 180 days a year. The confined feeding operation was built over the top of and drained directly into McMullen Creek. These corrals were removed and new corrals were built approximately 1 mile south of McMullen Creek.

All runoff from the new corrals is contained in a waste storage pond designed to appropriately hold 180 days worth of waste storage runoff. All necessary berming has been constructed to eliminate any potential runoff from entering any waterways. Once the old corrals were removed, the site was completely cleaned up of all the old storage sheds and debris. This site has been seeded to pasture grass.

The entire project site on each side of McMullen Creek has been fenced off from cattle grazing. The fencing begins at the High Line Canal and continues along the Creek to the north end of the property. The fencing-off of McMullen Creek means total exclusion from all cattle grazing.

Three off-stream watering troughs will be installed in the spring of 2006. The riparian areas on McMullen Creek were so saturated this fall the trench could not be dug to install the pipe to feed the watering troughs.

The Natural Resource Conservation Service and the Twin Falls Soil & Water Conservation District will work closely with the Kinsey family to ensure that the off stream watering is completed in the spring of 2006. The new corrals included the placement of gravel, concrete, steel panels, and the installation of frost-free water troughs (including the electricity to operate them.

All work completed to date has been in accordance with the appropriate Idaho NRCS Standards and Specifications.

Water Quality Monitoring

Water quality monitoring was done before the implementation of this project, from 2001-2002,. and this past irrigation season (2005). Since all of the components of this project have not been completed, monitoring will continue through the fall of 2006.

Table 6 through Table 9 provide a summary of all collected data.

Table 6. Kinsey Corral 2005 TSS (mg/L) means and loads (lbs/day).

Site	Av. Q	Mean. TSS	TSS Load
	cfs	Tons/yr.	Tons/yr.
MC2	6.57	8.45	54.61
MC3	0.41	6.27	2.53

Table 7. Kinsey Corral 2001 TSS (mg/L) means and loads (lbs/day).

Site	Av. Q	Mean TSS	TSS Load
	Cfs	Tons/Yr.	Tons/yr.
MC2	3.04	5.80	93.8
MC3	0.41	0.47	1.05

TSS at MC2 decreased by 42% from 2001 to 2005.

TSS at MC3 increased by 141% from 2001 to 2005. However, MC3 loads are quite low; we feel that with the fencing off of McMullen Creek this fall will decrease this sediment load by an estimated 65%.

Table 8. Kinsey Corral *E. coli* Data, MC2.

MC2			
Site	Av. Q	Av. *E. coli*	*E. coli* Load
	cfs	cfu/100 mL	lbs/day
2005	6.57	78	12.52
2001	3.04	676	48.01

74% reduction in E. coli at MC2.

Table 9. Kinsey Corral *E. coli* Data, MC3.

MC3			
Site	Av. Q	Av. *E. coli*	*E. coli* Load
	cfs	mg/L	lbs/day
2005	0.41	38.3	0.38
2001	0.41	156.5	1.57

76% reduction in E. coli at MC3.

Figure 44. Corrals built directly on McMullen Creek before cleanup.

Figure 45. Kinsey Corral: old corral site after cleanup.

Figure 46. Kinsey Corral: riparian area after cleanup.

Figure 47. Kinsey Corral: new corrals rebuilt one mile away from McMullen Creek.

Figure 48. Kinsey Corral: another view of the new corrals.

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Perrine Coulee Irrigation Return Flow Settling Ponds and Wetlands Projects

The Main Perrine Coulee originates from diverted water from the Low Line Canal approximately 3.5 miles southeast of Kimberly. The Coulee system begins in the agricultural and grazing zone of the Rock Creek drainage and undulates through miles of agricultural and grazing lands, crossing the McMillan area prior to entering the City of Twin Falls.

The coulee runs through the College of Southern Idaho campus and enters a wetland area built just south of North College Street. Then it runs back into agricultural and grazing lands on the northwest side until it comes to the Snake River Canyon Rim where it forms the Perrine Coulee Falls, entering the Snake River canyon, where it splatters amongst lava rocks and runs through wetlands prior to discharging into the Snake River at the Centennial Falls Park.

Throughout the whole length of the Main Perrine Coulee, a myriad of groundwater seeps impact the stream feeding it with additional water. The Main Perrine Coulee watershed drains a total area of approximately 21,000 acres of gravity flow irrigated agricultural land.

Problem

The Perrine Coulee watershed has been delivering excess sediment, nutrients, and bacteria to the Middle Snake River and impairing the designated beneficial water uses. Designated beneficial uses for the Middle Snake River from Rock Creek to Shoshone Falls include cold water aquatic life, salmonid spawning, primary contact recreation, secondary contact recreation and agricultural water supply.

The *Upper Snake Rock Watershed Management Plan* has been written and approved by the Twin Falls Regional Office (TFRO) and has defined the Perrine Coulee as one of the coulees where reductions in TSS, TP, and *E. Coli* will have a significant impact on the Middle Snake River.

The Perrine Coulee project is located at 42°31.86 N., 114°24.83 W. The HUC is 17040212-013 or the Shoshone Falls watershed. In the *Upper Snake Rock Watershed Management Plan*, this HUC is known as the Perrine Coulee Complex.

Plan

To help achieve the reductions in pollutants, the Twin Falls Canal Company, along with the Snake River Soil & Water Conservation District and TFRO, looked at ways to decrease the pollutants of concern on the Main Perrine Coulee.

Even with the conversion from furrow irrigation to sprinkler irrigation, it has not been enough to reduce the amount of runoff leaving agricultural fields. The *Compendium of Best Management Practices for Controlling Polluted Runoff*, (Meitl, Maguire 2003) lists best management practices for controlling runoff, with sediment retention wetlands among the suggested BMPs. It was decided that this would be the most beneficial way to achieve water quality goals in the Main Perrine Coulee and, therefore, the Snake River.

Actions

There are now two sediment basin/wetland complexes on the Main Perrine Coulee, which were funded through the NPS Program. The grant was awarded and construction began in October of 2003. The Snake River Soil & Water Conservation District purchased the property on which the project was built and has signed a perpetual conservation easement.

The Perrine Coulee Wetland Project covers approximately 14 acres. Perrine Coulee water is diverted into two main ponds:

- The first pond acts as an initial sediment pond. The pond is narrow and long and will be easy for the Twin Falls Canal Company to clean the sediment out on a regular basis.
- This water then moves into a 72,000 cubic yard sediment basin/wetland. This large pond is approximately 10 feet deep on the north and south ends, with fingers that extend from the center to the east and west that are planted with bulrush. In the center, there is an island, which extends for approximately 40 feet. The island has been planted with willows. The project includes construction of berms, banks and check structures. There are also concrete inlet structures and inlet and outlet culverts. Rock rip-rap was placed on the banks in areas where there was evidence of wind erosion.

Willows have been planted along the outsides of some of the banks for erosion control also. The roads in the project area are built and have been graveled for easy access. Bulrush has been planted in the wetland portion of the pond.

In April of 2005, the Snake River Soil & Water Conservation District was awarded a second grant for treatment of the Main Perrine Coulee. . This wetland is located five miles below the Main Perrine Coulee Wetland. The Snake River Soil & Water Conservation District purchased the six-acre piece of property and signed a perpetual conservation easement.

Results

Water quality monitoring data collected during the irrigation season of 2005, shows that the Main Perrine Coulee Wetland (Figure 49) is successful in removing pollutants from surface water. Water samples were taken above and below the wetland. This reduction is expected to decrease even further with the construction of the new Lower Perrine Coulee Wetland.

Background data has been collected and water quality monitoring will continue on both of these projects to get better estimates of the pollutant reductions. The total reductions for the Main Perrine Coulee Wetland are shown in Table 10.

Table 10. Main Perrine water quality data.

	TSS	TP	E. coli	N (2005)
Site 1 (above pond)	28,359.2 lb/day	89.9 lb/day	1,011.8 cfu/day	11 April-Oct.
Site 2 (below pond)	15,713.0 lb/day	67.5 lb/day	345.8 cfu/day	8 May-Oct.
% Reduction	44.6	24.9	65.8	
Estimated Load Reduction with Lower Wetland	55.6%	25.3%	53.9%	

After the Perrine Coulee exits from the Lower Perrine Coulee Wetland, it enters the City of Twin Falls where it receives storm water and urban runoff. TFRO was able to obtain grant money and furthered the treatment on the Main Perrine Coulee with two additional projects. The College of Southern Idaho (CSI)

Wetland Improvement Project increased the size of an existing wetland located on the CSI campus. This wetland complex is now double the size it use to be and will be much more effective.

The second project is the Centennial Watershed Complex and Riparian Buffer Zone. There will be a wetland complex with a 2-acre riparian buffer zone. The project is located at Centennial Park, where the Main Perrine Coulee enters the Snake River.

Figure 49. Main Perrine Coulee Wetland (Wetland located in center of photo)

Figure 50.Construction of Main Perrine Coulee Wetland.

Figure 51. Main Perrine Coulee Wetland inlet diversion.

Figure 52. Main Perrine Coulee Wetland inlet settling pond.

Figure 53. Main Perrine Coulee Wetland first water turned in.

Figure 54. Main Perrine Coulee two months afterestablishment.

Figure 55. Main Perrine Coulee Wetland outlet structure.

Figure 56. Lower Perrine Coulee Wetland construction start up.

Figure 57. Lower Perrine Coulee Wetland construction.

Figure 58. Lower Perrine Coulee Wetland construction.

Figure 59. Lower Perrine Coulee Wetland Inlet from Coulee.

Figure 60. Lower Perrine Coulee Wetland Inlet Structure.

Figure 61. Lower Perrine Wetland Cell.

Figure 62. Wetland Cell with bulrush planting.

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